Research Article

A Theoretical Note on the Relationship between Documented and Undocumented Migration

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Undocumented migration is a (inferior) substitute to documented migration. Hence, policies affecting documented migration also affect undocumented migration. This paper explores this relationship from a theoretical perspective. The implications of this exploration are that lax enforcement of visa rules and national borders, combined with a very long waiting line (small annual quotas) for immigrant visas, can make illegal immigration a preferred option over legal immigration or, more generally, that for policy purposes all types of migrations should be regarded as interdependent. Therefore, policies aimed solely at, say, undocumented immigration will generally be less effective than an integrated policy approach.

1. Introduction

Mass immigration is a hotly contested topic. Public concerns apply particularly to those who enter or stay without permission, often called undocumented immigrants. This paper studies the relationships between documented (legal) and undocumented (illegal) immigration, and to proceed, we first define who is an immigrant. We exclude short-term foreign business travelers and tourists. It is less obvious how to classify those entering on a student visa and planning to stay for several years.¹ For a systematic terminology in international migration statistics, see United Nations [1]. For the purpose of this study, we consider as immigrants only those who enter with the intention to work in the host country and plan to stay for the rest of their working life or beyond. We will not separately model all possible migration behaviors. Thus, in this study, we also consider as permanent those immigrants who are itinerant workers who move forth and back repeatedly between the home and the host country, assuming that the majority of their earnings are obtained in the host country.

We assume that here are only two ways to immigrate: legally (DIM) and illegally (UDIM). Under undocumented immigration (UDIM), we understand entry into a country

without permission or by ignoring the conditions of a visa to enter, such as staying beyond the expiration of the visa, not reporting to hearings regarding asylum applications [2] or engaging in activities excluded by the visa. The term undocumented can be misleading because the immigrant may have documents but they are either no longer valid, stolen, forged or the holder engages in activities they do not permit [3, 4]. By documented immigration (DIM) we mean legal entry into a country on a permanent resident visa ("Green Card" in the case of the USA, or a visa, such as an H-1B, that can lead to a green card). A legal immigrant (DIM) may engage in almost all legal activities open to citizens, with the exception of exercising political rights such as voting or holding an elected office², but relatively few other restrictions. They are also eligible for many benefits that are not legally available to UDIM. After a given period of residing in the host country, the legal immigrant usually becomes eligible to apply for citizenship¹. We assume that individuals assess the immigration opportunities available to them and choose the one offering the highest expected return.

UDIM is an important contributor to total immigration to the USA and many other industrial nations, but with differences. For example, compared to the USA, in the European Union a relatively larger number of UDIM came as asylum

seekers who stayed even when their request for asylum was denied. Because of open borders between EU member countries, policies need to be coordinated EU-wide. Guild et al. [5–7], Albrecht [8], and Carrero and Merlino [9] offer a review and discussion of European legal and policy perspectives. In the USA, a study prepared by the US Congressional Research Service lists an estimated 12 million individuals as present without authorization [4], which is similar to the figure reported by Passel and Cohn [10]. In 2008, the US labor force of 154 million included 8.3 million UDIM, or about 5.4% of the civilian labor force ([11]; for 2002 estimates see [12]). Immigration reform has proven to be difficult, as failed attempts by the G.W. Bush administration demonstrated. For a short while, the priority given to immigration reform by the American public seemed to have decreased, though it still ranked high [13, 14], but high unemployment and a slow recovery from the 2008 recession have moved it up again on the public's agenda [15]. For several decades, in the first half of the 20th century, the USA pursued a restrictive immigration policy that also favored “traditional” European immigrants. This changed with immigration reform that became effective in 1965. Although there have been additional changes to immigration law [15], the renewed immigration and, particularly, the much greater number of non-European immigrants can be traced back to the 1965 changes. For a review of UDIM policy in the USA from 1921 to 1965, see Ngai [16], and for a discussion of recent attempts at immigration reform and the relationship to labor shortages, see Martin and Ruhs [17]. Finally, Steinhardt [18] provides a recent study of the wage impact of immigrants to Germany on natives with similar qualifications.

Immigration reform is costly. The US Congressional Budget Office estimated that the proposed Comprehensive Immigration Reform Act of 2006 would have increased direct federal spending by \$13 billion over the period 2007–2011 and by \$54 billion over the period 2007–2016 [19]. For a recent discussion of the impacts of mass immigration in other countries, see Grubel [20]. For an early theoretical analysis of the fiscal impact of mass immigration at different levels of government, see Schaeffer [21], and for an earlier discussion of illegal immigration, see Hewlett [22], and Morris and Mayo [23]. The following articles provide a brief overview of major current topics regarding immigration, particularly in the USA: Borjas [24], Auerbach and Oreopoulos [25], Lee and Miller [26], Storesletten [27], Camarota [28], Cornelius [29], Espenshade [30], and Hanson [31]. It would be a mistake, however, to assume that illegal immigration is primarily a problem of the traditional immigration countries, as recent immigration nations, such as Italy and Spain, illustrate [32–35].

Not all immigrants enter the host country under the same conditions and with the same rights. For example, the USA has several categories of family-sponsored or employment-based paths to an immigrant visa (green card).³ Other categories include refugees, political asylum seekers, and, in the USA, the Diversity Immigrant Visa, better known to the general public under the name visa lottery. Applicants under each category face different probabilities of success. They

also have to wait for different lengths of time before they are allowed to enter, once their immigrant visa is approved.⁴ We also note that eligibility for some, but not all, categories is mutually exclusive, so that some applicants must choose which program to apply to while others may have no choice except a very long expected wait for a visa or undocumented entry. In this paper we consider home country conditions that contribute to the propensity to emigrate only implicitly, by focusing on those individuals who are expected to improve their well-being by moving to another country. Home country conditions' impact on emigration in the case of Mexico is discussed in Pew Global Project [36].

The basic logic of the theoretical model follows that of Schaeffer [37] as applied by Schaeffer and Kahsai [38] to study the H-1B visa program in the USA. An alternative approach could use the Harris-Todaro model [39] or its more general version [40]. This paper also differs from Ethier's work [41], which focuses on the relationships between the wage of illegal immigrants, the taxes they contribute, and border enforcement. While Ethier's model is more general in representing illegal migration than ours, he does not address the issue of legal versus illegal immigration, which is the focus of this research.

The remainder of this paper is organized as follows. In Section 2 we present the model in graphical form and derive first implications, and in Section 3, we extend the model. Section 4 concludes the paper and provides a summary of findings and conclusions.

2. The Model

Since both DIM and UDIM lead to immigration in the desired destination country, they can be regarded as substitutes for each other, a point made clear by Orrenius: “In the United State (and many other countries), simply restricting immigration to below the global demand for visas creates an incentive for foreigners to illegally immigrate ([42]; see also [43]).” The two types of immigration are imperfect substitutes, however, since legal immigrants enjoy many more rights and privileges than illegal immigrants who have a tenuous legal status. Therefore, there is little doubt that if DIM were freely available, there would be no UDIM. Not all prospective immigrants face the same probability of being granted a permanent immigrant visa. In the USA and most other countries, the foreign spouse of a citizen has an excellent chance to qualify and would, therefore, be ill advised to choose illegal immigration as an alternative. A very highly skilled individual might have a good chance at a permanent visa to the USA via the H-1B program [38], or similar program for immigration to other countries. A number of countries provide preferential treatment to affluent immigrants. In the USA, for example, the EB-5 program is for immigrants who commit themselves to invest at least \$1 million, or \$0.5 million if the investment is made in a targeted employment area [44]. Unskilled immigrants of small means are excluded from such opportunities. Even if they qualify for a family-based program, the queue and, therefore, the wait may be so long as to make UDIM the more attractive alternative.

Figure 1 represents the choice between DIM and UDIM. We assume that the household maximizes utility. For simplicity, we express utility as a function of income only. In reality, many more factors than income are considered in making location and work decisions (e.g., Pew Global Project [36]). We shall therefore regard the utility as a measure of the comparative well-being of individuals, subject to their migration choice (or choice not to migrate), and their success in entering the host country and being able to stay there. Thus, the prospective migrant compares the following two expected outcomes:

$$E[U_{\text{DIM}}] = p_{\text{DIM}}U(Y_{\text{DIM}}) + (1 - p_{\text{DIM}})U(Y_{\text{NM}}), \quad (1a)$$

$$E[U_{\text{UDIM}}] = p_{\text{UDIM}}U(Y_{\text{UDIM}}) + (1 - p_{\text{UDIM}})U(Y_{\text{NM}}). \quad (1b)$$

$E[U_{\text{DIM}}]$ and $E[U_{\text{UDIM}}]$ denote the expected utilities in the case of documented (legal) and undocumented (illegal) immigration, respectively. Similarly, p_{DIM} and p_{UDIM} are the respective probabilities of successful legal and successful illegal immigration. Y_{DIM} and Y_{UDIM} are the incomes of documented and undocumented immigrant households, respectively. We assume that $Y_{\text{UDIM}} < Y_{\text{DIM}}$ because undocumented immigrants face more labor market constraints than legal immigrants. The subscript NM stands for “no migration” and Y_{NM} is the household income when migration is not successful or not attempted. In this section, we also assume that illegal immigration precludes any possibility of legal immigration. This specifically excludes the possibility of an immigration amnesty. We will relax this assumption in Section 3. Finally, we start our analysis assuming that $p_{\text{DIM}} < p_{\text{UDIM}}$, since otherwise there would be no undocumented immigration. We interpret $1 - p_{\text{UDIM}}$ as the probability of an unsuccessful attempt at illegal immigration, regardless of whether individuals fail to make it across the border or succeed but are discovered and deported. A survey among Hispanic residents in the USA revealed that 53% of them worry about being deported; the percentages are 67% among foreign-born Hispanics and 32% among native born [45]. The impact of apprehension on migration behaviors is discussed in [46].

Figure 1 is drawn such that $E[U_{\text{DIM}}] < E[U_{\text{UDIM}}]$. Given the assumption we made, this outcome is likely if $p_{\text{UDIM}} - p_{\text{DIM}} > 0$ and large enough to compensate migrants who choose UDIM for the lower household income relative to migrants with identical qualification who choose DIM. The outcome is also possible if $p_{\text{UDIM}} - p_{\text{DIM}}$ is small as long as $Y_{\text{DIM}} - Y_{\text{UDIM}}$ is also small⁵. This latter situation could occur if there is no penalty for, and/or lack of effective enforcement against, employers who hire UDIMs.

One obvious implication is that a very restrictive legal immigration policy combined with lax enforcement of immigration laws increases the attractiveness of illegal immigration. In a legal environment that favors the highly skilled and/or the affluent, this also implies that the illegal immigrants are more likely to be low skilled and/or poor relative to their legal counterparts, since the latter often have

FIGURE 1: The choice between DIM and UDIM.

superior opportunities available to them. It follows from (1a) and (1b) that if $p_{\text{DIM}}U(Y_{\text{DIM}}) + (1 - p_{\text{DIM}})U(Y_{\text{NM}}) = p_{\text{UDIM}}U(Y_{\text{UDIM}}) + (1 - p_{\text{UDIM}})U(Y_{\text{NM}})$, then the prospective immigrant is indifferent between DIM and UDIM. This condition can be rewritten as

$$p_{\text{UDIM}} - p_{\text{DIM}} = p_{\text{UDIM}} \frac{U(Y_{\text{UDIM}})}{U(Y_{\text{NM}})} - p_{\text{DIM}} \frac{U(Y_{\text{DIM}})}{U(Y_{\text{NM}})}. \quad (2)$$

The first fraction on the RHS of (2) is the relative gain in utility from undocumented immigration and the second fraction that from document immigration. If LHS > RHS, then the prospective immigrant prefers DIM to UDIM. If the inequality is reversed, the preference is also reversed. Clearly, equilibrium is possible only if either $Y_{\text{DIM}} > Y_{\text{UDIM}}$ and $p_{\text{DIM}} < p_{\text{UDIM}}$ or if $Y_{\text{DIM}} < Y_{\text{UDIM}}$ and $p_{\text{DIM}} > p_{\text{UDIM}}$. The second set of conditions is very unlikely to occur in reality, so that only the first set is of practical interest. For any prospective migrant, if both inequalities point in the same direction, then either DIM or UDIM is the dominant choice.

The concavity of the utility function assumes that individuals are risk averse. The approximate probabilities used for obtaining the expected values are $p_{\text{DIM}} \approx 0.5$ and $p_{\text{UDIM}} \approx 0.85$, respectively. However, as Figure 1 shows, individuals who are risk averse consider not only the expected outcomes, $E[U_{\text{DIM}}]$ and $E[U_{\text{UDIM}}]$, respectively, but also the expected time before they achieve their goal of immigration. In the case of legal immigration, the expected time until the prospective immigrant receives the visa is given by $E[\Lambda_{\text{DIM}}] = \sum_{t=1}^{\infty} t p_{\text{DIM}} (1 - p_{\text{DIM}})^{t-1} = 1/p_{\text{DIM}}$. On average, successful migration takes the illegal immigrant less time, namely, $E[\Lambda_{\text{UDIM}}] = \sum_{t=1}^{\infty} t p_{\text{UDIM}} (1 - p_{\text{UDIM}})^{t-1} = 1/p_{\text{UDIM}}$. $E[\Lambda_{\text{DIM}}] > E[\Lambda_{\text{UDIM}}]$ because $p_{\text{DIM}} < p_{\text{UDIM}}$. Thus, although in the destination country illegal immigrants earn less than similarly qualified legal immigrants, the former can expect to earn higher wages than those paid in the origin

DIM and UDIM, with the possibility of amnesty, are given in (5).

$$\sigma(\Lambda_{\text{DIM}}) = \frac{\sqrt{1 - p_{\text{DIM}}}}{p_{\text{DIM}}}, \quad (5)$$

$$\sigma(\Lambda_{\text{DIM}}^{\text{UDIM}}) = \frac{\sqrt{1 - p_{\text{UDIM}} p_{\text{AMN}}}}{p_{\text{UDIM}} p_{\text{AMN}}}.$$

From the discussion following (4a) and (4b) and from (5), it follows that

$$E[\Lambda_{\text{DIM}}] = E[\Lambda_{\text{DIM}}^{\text{UDIM}}] \iff \sigma(\Lambda_{\text{DIM}}) = \sigma(\Lambda_{\text{DIM}}^{\text{UDIM}}). \quad (6)$$

Thus, there is no need to amend the discussion of the conditions of indifference between DIM and UDIM when amnesty has a positive probability.

4. Discussion and Conclusions

We started by noting that documented and undocumented immigration are substitutes. We presented a simple model of immigration to compare the tradeoff between documented and undocumented migration into a country. If there are no constraints on immigration, documented (legal) immigration is strictly preferred. However, we showed that there are sound theoretical reasons to expect that individuals could find UDIM an attractive alternative to DIM if permits for the latter are hard to obtain while at the same time border and immigration law enforcement is lax. For prospective immigrants with privileged access to DIM visas, however, UDIM may always be unattractive. Since the privileged groups include the affluent and the highly skilled, we can conclude that the poor and unskilled will be overrepresented among the UDIMs. All of these conclusions agree with empirical facts though empirical analysis requires data that are difficult to obtain or unavailable. Because of the uncertainty associated, particularly with illegal immigration, our analysis suggests that immigrants tend to be less risk averse than otherwise identical individuals who stay behind.

In general, this theoretical note suggests that immigration policy must be comprehensive to be effective, a conclusion also reached by Ethier [41] and Schaeffer [47]. That is, policy must consider the impact of one program—for example, one that privileges the affluent—on the demand for other programs and on UDIM. This research also reinforces what intuition tells us, namely, that policies and enforcement efforts must be coordinated. The level of enforcement that is sufficient to reduce UDIM to a politically and socially acceptable level is not constant but depends on the ease with which permanent legal residence visas can be obtained (p_{DIM}). In the extreme case of $p_{\text{DIM}} = 1$, no enforcement against UDIM is necessary because no rational individual would choose it. Conversely, a country that has a very restrictive immigrant policy must also have rigorous border and immigrant law enforcement.

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Endnotes

1. A comparison of the definitions of “immigrant alien” by the Department of Homeland Security versus that of “tax resident alien” by the US Internal Revenue Service reveals that the latter is much broader and includes students, among others. See <http://www.irs.gov/businesses/small/international/article/0,,id=96493,00.html> and <http://www.irs.gov/taxtopics/tc851.html> for more detailed information that shows some ambivalence regarding who is a resident with obligations towards the host country, versus a visitor with few obligations beyond law abidance.
2. Citizens of EU members who immigrate to another EU member country, even, have the right to participate and run for office in local elections in the host country. Since citizens of EU member countries are also citizens of the EU, the concept of “foreign” immigrant is ambivalent in the case of intra-EU migration.
3. The complete list of categories in the USA is available in the document SI 00502.215, The Affidavits of Support, Social Security Administration, <https://secure.ssa.gov/apps10/poms.nsf/lnx/0500502215#C>.
4. In the USA, several family-sponsored categories have backlogs of up to 10 years. The category for spouses of legal permanent residents has a backlog of 4 to 5 years. By contrast, only one of the employment-based categories had a backlog in 2009.
5. In agricultural employment, Pena [48] finds a wage difference between legal and illegal immigrants of “only” 6% to 7%. A bigger difference exists in the use of government aid programs. She concludes from her analysis that an amnesty for farm workers would have a minimal impact on workers’ outcomes or on food prices in the USA.
6. A numerical example may help illustrate the relationship (without amnesty). Let $p_{\text{UDIM}} = 0.5$ and $p_{\text{DIM}} = 0.1$. Assume that $U(Y_{\text{UDIM}}) = 1.2U(Y_{\text{NM}})$. Then, (2) says that a prospective immigrant is indifferent between DIM and UDIM if $U(Y_{\text{DIM}}) = 3.0U(Y_{\text{NM}})$.
7. If we let $p_{\text{UDIM}} = 0.5$ and $p_{\text{DIM}} = 0.1$ as in footnote 3, then $E[\Lambda_{\text{DIM}}] = 10$. $E[\Lambda_{\text{UDIM}}] = 10$ if and only if $p_{\text{AMN}} = 0.2$; that is, if amnesty is granted every five years, on average. However, note that for these three values $E[U(Y_{\text{UDIM}})] < E[U(Y_{\text{DIM}})]$, so that DIM would be preferred to UDIM. The determination of the exact point of indifference is impossible without specifying the functional form of the utility.

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